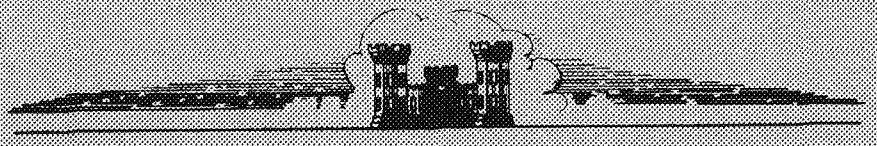
NANTUCKET HARBOR
MASSACHUSETTS

SURVEY
(REVIEW OF REPORTS)



U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS WALTHAM, MASS.

OCTOBER 1965

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20315

IN REPLY REFER TO

ENGCW-PD

SUBJECT: Nantucket Harbor, Massachusetts

TO: THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress the report of the Board of Engineers for Rivers and Harbors, accompanied by the report of the Division Engineer, in response to a resolution of the Committee on Public Works of the House of Representatives, United States, adopted 2 June 1949, requesting the Board to review previous reports on Nantucket Harbor, Massachusetts, with a view to determining if it is advisable to modify the existing project in any way at this time.

2. The Division Engineer finds that improvement of the channel by increasing its depth to 18 feet would be economically justified should it become desirable in the future to utilize vessels requiring such depth. He also finds that construction of a 1,400-foot long stone breakwater inside the harbor on Hussey Shoal would be feasible and economically justified but local interests are not in agreement as to the location and type of protection desired and are unable or unwilling to meet the requirements of local cooperation. Therefore, he recommends that no improvement to the existing Federal project be undertaken at this time.

3. The Board of Engineers for Rivers and Harbors, noting that channel improvements are not required by existing traffic and that local interests are unable or unwilling to meet the requirements of local cooperation for construction of a breakwater, reports that modification of the existing Federal project for Nantucket Harbor, Massachusetts, is not advisable at this time.

4. I concur in the views of the Board.

WILLIAM F. CASSIDY
Lieutenant General, USA
Chief of Engineers

ENGBR(22 Oct 65) 1st Ind
SUBJECT: Survey (Review of Reports) of Nantucket Harbor, Massachusetts

Board of Engineers for Rivers and Harbors, Washington, D. C. 20315
3 December 1965

TO: Chief of Engineers, Department of the Army

1. The Division Engineer issued a public notice stating his findings and recommendation and affording interested parties an opportunity to furnish additional information to the Board. No communications have been received.

2. The Board notes that existing and future vessel traffic on the waterway would not require further deepening beyond that already authorized. It further notes that construction of a breakwater is needed and economically justified but local interests are unable or unwilling to meet the requirements of local cooperation. Therefore, the Board reports that modification of the existing Federal project for Nantucket Harbor, Massachusetts, is not advisable at this time.

FOR THE BOARD:

R. G. MacDONNELL
Major General, USA
Chairman

SURVEY (REVIEW OF REPORTS) OF NANTUCKET HARBOR NANTUCKET, MASSACHUSETTS SYLLABUS

The Division Engineer finds that modification of the existing Federal navigation project for Nantucket Harbor is not warranted at this time. Improvement of the channel by increasing its depth to 18 feet would be economically justified should it become desirable in the future to utilize ferries requiring this depth. The estimated first cost is $300,000 for new work and the benefit-cost ratio 4.4 to 1.0.

The Division Engineer finds that lack of a protected anchorage in Nantucket Harbor restricts its use sufficiently to justify protection within the lower harbor. This could be economically accomplished by means of a 1400-foot long stone breakwater located on Hussey Shoal approximately 2400 feet east of and roughly parallel to the commercial waterfront. The total first cost of construction of this breakwater is presently estimated at $410,000, exclusive of navigation aids estimated at $30,000 and preauthorization studies. The annual maintenance cost is estimated to be $1,200. Based on benefits as a harbor of refuge and reduction of storm damage to commercial and recreational craft with incidental shore protection, the benefit-cost ratio is 2.1 to 1. Local interests would be required to make a cash contribution presently estimated at $160,000 and provide a public landing open to all on equal terms. However, local interests are not in agreement as to the location and type of harbor protection that would meet their needs. Town officials have stated that the Town is unable to meet requirements of local cooperation at this time. They have requested that any further consideration of breakwater protection be held in abeyance.

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U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASS. 02154

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO. NEDED-R

22 October 1965

SUBJECT: Survey (Review of Reports) of Nantucket Harbor, Massachusetts

TO: Chief of Engineers
ATTN: ENGCW-PD

AUTHORITY

1. This report is submitted in compliance with a resolution adopted 2 June 1949, by the Committee on Public Works of the House of Representatives, United States Congress, which reads as follows:

> "RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Nantucket Harbor, Massachusetts, submitted in House Document 115, 77th Congress, 1st Session, and previous reports, with a view to determining if it is advisable to modify the existing project in any way at this time."

2. A study of survey scope was directed by the Chief of Engineers to the New England Division on 5 July 1949.

PURPOSE AND EXTENT OF STUDY

3. This study considered what modification of the existing Federal navigation project for Nantucket Harbor, Massachusetts would be needed to meet the needs and desires of local interests for deepening and widening the entrance channel and the reduction of wave action by construction of a breakwater within the harbor.

Detailed hydrographic and topographic surveys were made to determine existing channel depths and conditions. Extensive soundings were made in areas desired for improvement and compared with available maps and other subsurface data to determine the type, location and volume of materials to be removed and the foundation conditions for a breakwater site. A public hearing was held at Nantucket, Massachusetts on 16 April 1957 to obtain the views of local interests on desired navigation improvements. By correspondence and informal meetings in 1963 and 1964 with local interests, including local officials and representatives of the Steamship Authority, current data was obtained to supplement information previously submitted. Engineering and economic studies of desired improvements were made, based upon the information furnished and on available maps, charts and aerial photographs.

DESCRIPTION

4. Nantucket Island is located in the Atlantic Ocean 25 miles south of Cape Cod, 38 miles southeast from Woods Hole, and 50 miles from New Bedford, Massachusetts. The island is 14 miles long and 3 to 6 miles wide, with a land area of 49.5 square miles, containing large expanses of low flat land in the south and southwest.

5. Nantucket Harbor is located on the north side of the island. The approach to the entrance to the harbor is through the relatively deep waters of Nantucket Sound. The entrance channel, 300 feet wide and 15 to 24 feet deep, lies between two converging jetties. At the bend north of Brant Point, the channel gradually increases to a maximum width of about 800 feet. The commercial harbor just inside of Brant Point is about one mile square, with the principle wharves along its western side. Depths vary from 13 to over 17 feet in the channel leading toward the wharves to less than 2 feet on Hussey Shoal, a triangular shaped bar lying about 2,000 feet east of the wharves. A natural channel 8 feet deep extends around the southern edge of Hussey Shoal along the south shore of the harbor for a distance of about one mile. The harbor between the shoal and the wharves on the west shore has depths ranging from 9 to 18 feet. Part of the area is used for anchorage. The mean tide range is about 3 feet and the spring range is 3.6 feet.

6. Between Brant and Coatue Points, north of Hussey Shoal a natural channel approximately 200 feet wide and 10 to 20 feet deep

leads into an area known as the upper harbor. This portion of Nantucket Harbor extends from Hussey Shoal northeasterly for a distance of 5 miles, varying from 1/2 to 1-1/2 miles wide, separated from Nantucket Sound on the north by a narrow barrier beach (Coatue Beach).

7. Two points extending northerly from the main part of the island divide the upper harbor into three sections, with maximum depths varying from 18 to 26 feet. A channel with a controlling depth of 6 feet connects the western section with the center. The center and the eastern area (known as the Head of the Harbor) are connected by a winding channel, obstructed by three sand bars on which the controlling depth is 3 feet. There are no navigation aids in the upper harbor, passage requires skillful navigation and knowledge of local conditions. The head of the harbor is separated from the Atlantic Ocean by a narrow strip of sand known as Haulover Beach. The location of Nantucket Island and its harbor are shown on U. S. Coast and Geodetic Survey Chart Nos. 265, 343 and 1209, and the map accompanying this report.

BRIDGES AFFECTING NAVIGATION

8. There are no existing or proposed bridges in the area.

TRIBUTARY AREA

9. Nantucket Island had a permanent population of 3,559 in 1960 with a density of 72 persons per square mile. This population has remained fairly constant in recent years. This is the most recent census taken on the island. The summer population is several times that of the permanent population, spread in colonies throughout the island. Most of the commercial activity and the permanent residents are located in the village of Nantucket on the west shore of Nantucket Harbor.

10. Nantucket has become one of the most popular recreational spots in the United States, well-known as a summer resort and boating center. Ship service, chandlering, fishing and providing for the needs of summer visitors are the major sources of local income. There is some agriculture, manufacturing, construction, wholesale and retail trade on the island.

11. Just prior to World War II the islands of Nantucket and Martha's Vineyard were served by a fleet of four steamers operated by the New England Steamship Company, a subsidiary of the New Haven Railroad. At the end of World War II the New Haven Railroad liquidated its holdings and made no effort to replace two of the ferries which had been used in war service and not returned to the line. The remaining portion of the company was finally sold in 1946 to the Massachusetts Steamship Line Inc.. This company recognized the need for a modern vessel to improve service. All studies indicated a new ferry would cost approximately $1,000,000. Private capital for such an investment was not available. This led to the creation by the Massachusetts State Legislature of the New Bedford, Woods Hole, Martha's Vineyard and Nantucket Steamship Authority. This Authority was authorized by Chapter 544 of the Resolves of 1948 to issue a maximum of $6,000,000 in revenue bonds in order to acquire the assets of the Massachusetts Steamship Lines and rebuild service to the islands. Passengers and freight are now carried to Nantucket on two ferries owned by the Authority. Year-round daily service is maintained, under favorable weather conditions. In addition, during the summer season, some passengers and freight are carried to the islands by charter vessels operating from various ports on the mainland. Commercial interests have continuously stressed the need for expanded ferry service as the vessels operated by the Authority provide a vital link to the community.

12. Northeast Airlines, Inc. provides service to Nantucket from Boston, New York and Hyannis. The outlying summer settlements are connected with the town and main harbor by an improved road system. Bus lines providing transportation in Nantucket are the Nantucket and Sconset Bus Line Inc. and the Chester S. Barrett Transportation Service. There is no rail service on the island.

PRIOR REPORTS

13. Nantucket Harbor has been the subject of 11 reports since 1827. There were five reports through 1885 of which three are the basis for the existing Federal project. The more recent reports are tabulated below:

Published In	Nature of Report	Work Considered & Recommended
Unpublished dtd 12 Feb. '26	Preliminary Examination	Unfavorable to dredging a channel through Haulover Beach

Published In	Nature of Report	Work Considered & Recommended
Unpublished, dtd 3 Dec. '28	Preliminary Examination	Unfavorable to widening entrance channel, dredging anchorage in main harbor and cutting channel through Haulover Beach
Unpublished, dtd 9 Dec. '31	Preliminary Examination	Unfavorable to widening entrance channel and dredging anchorage in main harbor
Unpublished, dtd 27 May '35	Preliminary Examination	Unfavorable to breakwater on Hussey Shoal, a channel to the upper harbor and a channel through Haulover Beach
Unpublished, dtd 15 Dec. '39	Preliminary Examination	Unfavorable to channel through Haulover Beach
H.D.No. 115, 77th Congress, 1st Session	Survey Report	Favorable to dredging anchorage, fairway in main harbor. Project adopted by R&H Act of 1945

EXISTING CORPS OF ENGINEERS PROJECT

14. Under a former project, adopted in 1829, an attempt was made in the years 1829 to 1831, to dredge a channel 17 feet in depth at low water and 200 feet wide across the bar at the present harbor entrance. The attempt was not successful as the controlling depth was increased by only 1.5 to 7.5 feet. It is reported that the resulting channel nearly filled during one storm. Total cost for this former project was $45,834.75.

15. The existing project, adopted in 1880 and modified in 1886 and 1945, provides for: (1) a channel 15 feet deep, without prescribed width, through the bar at the entrance for a length of 1.6 miles, (2) an anchorage area of about 50 acres just west of Hussey's Shoal 15 feet deep, 300 to 1,100 feet wide and 2,800 feet long; (3) a fairway 15 feet deep, 200 feet wide extending southward along the west side of the anchorage to a point about 2,700 feet south of Brant Point; and (4) two rip-rap jetties, the east jetty 6,987 feet long and the west jetty 6,500 feet long.

16. The two jetties at the entrance were considered necessary to control littoral drift and to concentrate the action of tidal currents to scour and maintain the channel between them. The west jetty was authorized in 1880. About 5,700 feet was constructed. The east jetty was authorized in 1886 and about 7,000 feet was constructed. Both jetties have proven effective as constructed and are considered to have fulfilled their intended purpose.

17. The entrance channel was dredged to a 15-foot depth for a width of 300 feet, widened at the bend north of Brant Point to a maximum width of about 800 feet. The costs under the existing project have been $456,482 for new work and $277,300 for maintenance, a total of $733,782. The present approved annual cost of maintenance is $10,000.

18. No work has been accomplished on the 15-foot anchorage and fairway, authorized in 1945. This portion of the project is in an inactive status as described in paragraph 19. The latest estimated cost is $193,500 (1957 prices) of which the local share would be $31,500.

LOCAL COOPERATION ON EXISTING AND PRIOR PROJECTS

19. The only condition of local cooperation ever prescribed for Nantucket Harbor was contained in the authorization of the 15-foot anchorage and fairway. It consisted of a $31,500 cash contribution toward construction of the project. In 1957, Federal funds in the amount of $162,000 were appropriated for completion of this part of the project. Local interests were notified in June 1956 that the project was to be undertaken. In response to a request for compliance with the requirements of local cooperation, local interests indicated that needs in the harbor now rendered the 15-foot anchorage and fairway unnecessary and expressed a desire that the appropriated funds be used for breakwater construction. Local interests were informed that construction of a breakwater in lieu of dredging an anchorage was considered a major modification of the project and that available funds could not be used for that purpose. The completion of the fairway and anchorage phase of the authorized project was placed on an inactive status.

OTHER IMPROVEMENTS

20. The Commonwealth of Massachusetts, in cooperation with other local interests, has removed numerous boulders from the vicinity of the wharves and has provided anchorage areas and improved fairways within the harbor proper. As a result of this work, the channel around Brant Point has been widened to 300 feet by removing the Northwest point of Hussey Shoal; a 12-15 foot anchorage has been dredged between the wharves and Hussey Shoal with two channels 15 feet deep projecting toward the wharves, a 4-foot anchorage has been provided south of Brant Point and adjacent to the Nantucket Yacht Club; and a 14-foot maneuvering area southwest of Brant Point extending in and around the wharves. In 1938 and 1939 a rectangular anchorage area 1,000 feet by 60 feet, located east of the wharves and south of Brant Point was dredged to a depth of 15 feet at a cost of $49,470.85 of which $25,000 was contributed by the town. This anchorage area was included in the Federal project as modified in 1945. The latest improvement by the Commonwealth was made in 1953. About 60,000 cubic yards of dredging was accomplished at a cost of $54,000. With the exception of a few shoals, in the entrance channel, this dredging was entirely outside the limits of the Federal project. The total cost of these improvements has been about $185,000 of which the town contributed about a fourth of the cost.

TERMINAL AND TRANSFER FACILITIES

21. There are four commercial piers on the west side of the harbor, located within a space of about 1,300 feet, along the water-front. These piers have uniform lengths of about 400 feet and are of pile and timber construction.

22. Data concerning the four commercial wharves are as follows:

a. The ferryboat landing of the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority has depths along side of about 16 feet. It has facilities for handling rolling stock and a shed for storage of freight. Truck access is available. Public use of the pier is not permitted. Neither water nor fuel are available. The wharf is in good condition.

b. Straight wharf, owned by Nantucket Marine Inc., has depths alongside of about 15 feet with a berthing area of about 250 feet

available for public use by agreement with the owner. It is accessible by road. Fuel tanks and a storage yard are part of the facility. Water, fuel and service facilities are available. Two boat companies and transient craft use the dock regularly. The dock is in good condition.

c. The Island Service Co. Wharf has depths alongside of about 12 feet with 600 feet of berthing space available for public use subject to the owners usage and convenience. Truck access, unloading hoist, fuel and water facilities, and a public float are available. The pier is used by small oil tankers, fishing vessels, coal barges and transient recreational boats. The dock is in good condition.

d. The Commercial Wharf has a single berth with a depth of about 12 feet used for loading and unloading passengers using charter boat service from Hyannis. No service facilities are available. The wharf is in poor condition.

23. In addition to the commercial wharves, there are several privately owned piers used by recreational craft. There is also a small boatyard in the southwest part of the harbor equipped with a marine railway capable of hauling boats up to 20 tons, and a storage shed and yard for 169 boats. The town does not own a public wharf.

IMPROVEMENT DESIRED

24. In order to afford local interests an opportunity to express their views concerning the extent, character and need of modification to the existing Federal navigation project, a public hearing was held at Nantucket, Massachusetts on 16 April 1957. Present at the hearing were representatives of Federal, State and local governments, commercial fishermen, local businessmen and other town residents.

25. At the hearing, local interests agreed that the presently uncompleted authorized 15-foot anchorage and fairway inside the harbor were neither desired nor needed at this time, as the craft presently using the harbor for anchorage do not require this depth.

26. Because of the exposed position of the harbor to northeast storms, proposals for modification of the existing project centered around construction of a breakwater on the east side of the commercial harbor, to protect the commercial docks and provide sheltered anchorage. One proposal for improvement included construction of a steel

sheet pile jetty with a roadway on top, extending from Monomoy Beach into the harbor, then turning toward the commercial piers for a total length of about 3,300 feet. A bridged opening of about 300 feet for water circulation next to Monomoy Beach was included in the proposal. An area on the west side of the jetty would be dredged for an anchorage. The plan would also include a series of finger piers extending from the jetty toward the anchorage. This Monomoy Beach jetty proposal was supported by the Fishermen's Association, town officials and a number of local residents.

27. A second proposal presented at the hearing consisted of a stone breakwater on Hussey Shoal parallel to the commercial waterfront, about 1,500 feet long and high enough to break storm waves approaching from the upper harbor.

28. Subsequent correspondence of 19 July 1957 from the Board of Selectmen requested that a proposal studied by a Town Public Wharf Committee in 1953 be considered under this study. The committee recommended a protected anchorage as a harbor of refuge in the area known as "The Creeks" at the southeast corner of the commercial harbor. The plan consisted of dredging and bulkheading a basin 400 feet by 300 feet with an access channel 75 feet wide and depth of 6 feet. The committee estimated the dredging and bulkheading would cost approximately $150,000 (1957 prices).

29. In a letter dated 3 November 1961, the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority requested consideration of widening the existing entrance channel adjacent to the western end of Coatue Point and dredging the channel to a depth of 18 feet mean low water. The Steamship Authority stated that the channels at Vineyard Haven and Woods Hole are deeper and that the Nantucket Harbor entrance is the determining factor in the design draft of any future ferry to be used by the Authority.

EXISTING AND PROSPECTIVE COMMERCE

30. Commercial shipments to Nantucket over the past ten years has remained fairly constant. A labor dispute involving the Steamship Authority disrupted ferry service in 1960, for about two months. Four manufacturing, three wholesale and 61 retail firms are the principle sources of employment. The growing popularity of the island as a summer resort is indicated by the yearly traffic in passengers and automobiles. Annual freight tonnage, passengers and vehicles transported to the island from 1954 to 1963, together with a detailed statement of 1963 major commodity shipments are given in Tables 1 and 2.

TABLE I
COMMERCE SINCE 1954

Year	Tons	Passengers	Automobiles Accompanying Passengers
1954	30,063	208,024	10,589
1955	32,710	166,957	10,818
1956	28,617	159,633	11,231
1957	39,574	224,199	14,369
1958	36,148	180,421	12,744
1959	31,259	172,455	16,578
1960	26,717	146,641	13,415
1961	37,344	205,033	21,134
1962	35,587	156,521	20,394
1963	35,988	162,303	18,299

TABLE II
FREIGHT TRAFFIC, 1963 (Latest Data Available)

Commodity	
Fish and products, fresh	28
Shell fish and products	458
Gasoline	4,336
Gas Oil, distillate fuel oil	11,133
Kerosene	1,975
Residual fuel oil	3,336
Commodities, nec.	14,722
Total	35,988

31. Local officials consider that both resident and transient fishing vessels would use the harbor more frequently as an intermediate market for fish and scallops if breakwater protection were provided for the commercial harbor. With increased channel depth a ferry vessel of deeper draft capable of carrying modern refrigeration trucks could provide economical shipment of fish products to mainland markets.

VESSEL TRAFFIC

32. Vessel traffic consists of ferry steamers with 10-1/2 foot drafts that make daily trips, weather permitting from Vineyard Haven

and the mainland. Three major companies on the island are supplied with fuel oil and gasoline by tug and barge-tows, self-propelled barges and tankers having drafts ranging from 13 to 14 feet. There are 12 trawlers of average lengths of 50 feet with drafts of about 12 feet and 50 scallopers of about 20-foot lengths and 2-foot drafts that operate out of the harbor. Small excursion vessels operate seasonally from the mainland. The number of trips and drafts of vessels for the year 1963 are given in Table 3.

33. At the public hearing held in 1957, local interests furnished information on the composition of the locally based recreational fleet as follows:

Type	Length	No.	Value
Outboards	10'-20'	100	$85,000
Inboards	10'-20'	60	66,000
Cruisers	21'-35'	15	90,000
Total		175	$241,000

In addition there are 500 rowboats with a total value of $50,000 which are moored close to shore. These rowboats are not expected to receive any benefit from any harbor improvement. Improved navigation facilities would benefit 175 boats. A general expansion of recreational fleets has occurred in recent years, amounting to about 5% per year. It is estimated that the existing fleet amounts to 220 boats valued at about $301,000. Transient vessels visiting Nantucket up to 1951 were reported by local interests to total to 1731 craft. Because the island is conveniently located on the navigational route of recreational craft cruising southern New England waters, it is estimated that presently over 2,000 boats visit Nantucket Harbor each boating season for an average stay of 4 days. These craft range from small cabin cruisers to large auxiliary sailboats. The harbor master reported at the time of the public hearing that the number of transient craft serviced average 1,600 boats per year. Nantucket is the nearest harbor to a large portion of the offshore fishing grounds, as a result many charter and sport fishermen use the harbor on excursions from points on the mainland. Local interests believe that some of these, sport fishermen would transfer operations to the harbor and the number of transient would double if shelter from northeast winds were available.

TABLE 3
TRIPS AND DRAFTS OF VESSELS (1963)

Draft (feet)	Inbound					Outbound				
	Self-Propelled Vessels			Non-Self Propelled Vessels		Self-Propelled Vessels			Non-Self Propelled Vessels	
	Passenger and Dry Cargo	Tanker	Towboat or Tugboat	Tanker	TOTAL	Passenger and Dry Cargo	Tanker	Towboat or Tugboat	Tanker	TOTAL
13	68	2	-	1	71	68	-	-	-	68
12	-	6	-	-	6	-	-	-	-	-
11	570	7	2	-	579	570	1	2	-	573
10		6	2	1	9	-	11	2	-	13
9	-	-	-	-	2	-	10	-	-	10
8		-	-	-	-	1	1	-	-	2
6 & less	7253	-	2	4	7259	7252	-	3	7	7262
TOTAL	7891	23	6	6	7926	7891	23	7	7	7928

DIFFICULTIES ATTENDING NAVIGATION

34. The commercial harbor of Nantucket is exposed to strong winds accompanying coastal storms and hurricanes blowing from an easterly or northeasterly direction across the 5 mile reach of the upper harbor. Waves generated in the harbor by these winds may reach a height of 4 feet along the waterfront, causing considerable damage to craft berthed at the piers and to shore installations. With poor holding ground under storm condition in the exposed anchorage, many boats are driven ashore. During the boating season visiting craft, when given sufficient advance warning, leave the harbor to seek shelter along the coast of Cape Cod or move into the lee of Nantucket Island along with the commercial fishing fleets operating in the area.

35. With respect to the entrance channel to Nantucket Harbor, the Steamship Authority claims that existing conditions of depth has limited the design of a ferry to one with a draft of less than 11 feet. It is claimed that a ferry of the type and size needed to serve Nantucket Island should have a draft of 14 feet or greater, with under keel clearance greater than normally required for other types of commercial vessels, in order to provide adequate stability and maneuverability. Due to the remoteness of the harbor in relation to other ports of call, fuel supply vessels drawing 13 to 14 feet of water often arrive at low tide stage and are forced to wait outside for a favorable tide before approaching fuel terminals to complete deliveries. These tidal delays are due mainly to inadequate depths at terminal berths.

WATER POWER AND OTHER SPECIAL SUBJECTS

36. The waterway is tidal. There are no problems of flood control, water power or pollution pertinent to the report. The U. S. Fish and Wildlife Service does not contemplate any adverse effect on fish and wildlife resources should the requested improvements be made.

PLAN OF IMPROVEMENT

37. A plan of improvement which meets the desires of Woods Hole, Martha's Vineyard and Nantucket Steamship Authority and other local interests has been prepared. It consists of deepening

the existing 15-foot entrance channel to a depth of 18 feet, 300 feet wide from the entrance bar into the harbor to a point 300 feet from the Steamship Authority terminal, a distance of 2.4 miles and widening of the channel in the bend north of Brant Point to a width of 650 feet, 18 feet deep, to permit safer use of the harbor channel by deeper draft vessels and the ferries under all weather conditions. The location of the proposed dredging is shown on the accompanying maps.

38. At the public hearing local interests expressed a desire for breakwater protection inside the commercial harbor to protect shore installations and small boats against waves approaching from the upper harbor. Three plans presented by local interests have been considered during the study.

39. To provide protection in the less congested area in the southern part of the harbor, local interests presented a plan for a breakwater adjacent to Monomoy Beach. The proposed breakwater would consist of a double row of sheet steel piling spaced 25 feet apart, filled with sand and gravel, and extending from a point on Monomoy Beach northwesterly for 1,800 feet then turning west toward the wharf area for another 1,500 feet, a total distance of 3,300 feet. The inshore end of the breakwater would have a bridged opening of about 300 feet which would allow for circulation of water around the end. This breakwater would provide for about 41 acres of protected anchorage with depths of 8 feet or more. Dredging would be required to provide a total of 66 acres of anchorage 8 feet deep as desired. Town officials stated that if the breakwater was constructed several finger piers would be placed on the lee side of it. These piers would allow for docking vessels during stormy periods. A preliminary estimate indicates that the cost of the desired sheet steel pile breakwater together with dredging required to provide sufficient anchorage would approximate one and one-half million dollars. Benefits to be derived would be about one-half the annual carrying charges necessary for such costs. It is concluded that the desired Monomoy Beach breakwater is not economically justified at this time.

40. The "Creeks" proposal provided for taking land sufficient for the needs of the plan along the south shore of the harbor. The area proposed would provide for 3 acres of anchorage dredged and bulkheaded in the marsh, with a 75-foot wide entrance channel, 1,300 feet long, 6 feet deep. Examination of this plan reveals that

the protection provided would be limited to boats drawing less than 6 feet, excluding fishing vessels and larger recreational craft. The proposed anchorage basin would provide only for existing boats requiring 6 feet or less, with no room for expansion or accommodation of transient craft. For this reason, it is not considered that sufficient benefits can be derived to economically justify construction of this improvement.

41. The third plan of protection taken into consideration was construction of a stone breakwater on Hussey Shoal which would provide protection to the existing anchorage and the waterfront from northeast storms. Cost of this breakwater would be about one-third the cost of the breakwater at Monomoy Beach and from the shelter provided to fishing and recreational craft it appears to be economically justified. The selection of the proper location for a breakwater on Hussey Shoal involved a compromise between cost and effectiveness. It has been determined that the location of the most economically effective breakwater on Hussey Shoal would be roughly parallel to and about 2,400 feet east of the commercial wharves. This 1,400 foot long stone breakwater would shelter about 30 acres partially and 20 acres substantially. The sheltered area would provide adequate mooring ground for recreational boats in the summer and for fishing fleets operating out of mainland ports during the winter months. Wave heights along the waterfront would be reduced, providing safe berthing under nearly all weather conditions.

SHORELINE CHANGES

42. The configuration of the adjacent shoreline is not anticipated to be adversely affected by the deepening of the entrance channel or construction of a breakwater on Hussey Shoal.

REQUIRED AIDS TO NAVIGATION

43. The U. S. Coast Guard has been consulted and has advised that the proposed channel improvement would require no additional marking buoys as an aid to navigation. The proposed breakwater would require two single pole lights, one at each end of the breakwater. The first cost is estimated at $30,000 and annual maintenance cost at $600.

ESTIMATE OF FIRST COST

44. An estimate of the first cost of the channel improvement considered in this report is based on a survey made in June 1964. Quantities have been estimated for dredging the existing project to a depth of 18 feet mean low water plus an allowance of one foot overdepth with side slopes of one vertical to three horizontal. All dredging would be ordinary material, consisting of clay, sand and gravel removed hydraulically and deposited in approved on shore spoil areas. The cost estimate is based on January 1965 price levels and includes an allowance for contingencies.

PROJECT CONSTRUCTION COST

Dredging	$230,000
Contingencies	35,000
Engineering and Design	15,000
Supervision and Administration	20,000
Total Federal Construction Cost:	$300,000
Non-Federal Cost (berth improvement)	$ 45,000
Total Project Cost	$345,000

45. The first cost of construction of the proposed breakwater on Hussey Shoal is based on a tentative design wave of 4 feet and other design criteria consisting of side slopes of 1 vertical on 1.5 horizontal, top width of 5 feet and top elevation of 5 feet above mean high water. The estimate of first cost includes allowances for contingencies, engineering, design, supervision and administration.

Estimated First Cost - Hussey Shoal Breakwater

Stone breakwater, 1400 feet long, top 5 feet above MHW, top width 5 feet side slopes 1 on 1-1/2	
Stone: Armor	$149,000
Core	168,000
	317,000
Contingencies	48,000
Construction Cost	$365,000

Estimated First Cost - Hussey Shoal Breakwater (Cont'd)

Engineering and Design	20,000
Supervision and Administration	25,000
Total Construction Cost	$410,000*
Navigation Aids	30,000
Total Project Cost	$440,000

*Exclusive of $10,000 preauthorization studies.

ESTIMATES OF BENEFITS

46. Modification of the existing project by deepening and widening the entrance channel would decrease the existing navigation difficulties experienced by ferry boats and other vessels transporting supplies to Nantucket Island.

47. The Woods Hole, Martha's Vineyard and Nantucket Steamship Authority plans to place hydrofoil passenger ferries into scheduled operation in the near future. These vessels will not be materially benefited by channel improvement. However, with increased passenger service to the island, the demand for additional vehicle shipment must be met.

48. The Steamship Authority ferries currently using the harbor are limited to a design draft of 10-1/2 feet by Coast Guard regulations, in order to pass safely in and out of Nantucket Harbor. One of these vessels is designed to carry 50 cars when fully loaded. However, experience has proven that in order to maintain proper trim for maneuverability under adverse conditions only 40 cars can be carried, chiefly due to the shallow draft requirement. The other vessel with a capacity of 28 automobiles is approximately 40 years old. The Steamship Authority has recently had a new ferry of 25 car capacity built and placed into operation in the summer of 1965.

49. The volume of traffic moved over the Steamship Authority line from Woods Hole to Nantucket for the past three years is

indicated in Table 4. This table shows only the traffic to Nantucket and does not include that transported to Martha's Vineyard. During the summer additional passengers and freight are carried by charter vessels as reflected in Table 1. The number of vehicles stated in Table 4 reflects those carried by the Steamship Authority and delivered with and without accompanying passengers.

TABLE 4

TRAFFIC TO NANTUCKET FROM WOODS HOLE

Year	Number of Trucks	Number of Automobiles	Freight (in tons)	Number of Passengers
1961	3,350	16,433	20,400	126,611
1962	3,188	17,403	19,506	125,944
1963	3,424	20,365	23,328	137,647

a. Based on graphs and figures supplied by the Steamship Authority, the total number of vehicles transported over the lines from Woods Hole to Martha's Vineyard and Nantucket during 1963 was approximately 93,000 vehicles of which 20,365 (21.9%) cars and 3,424 (3.7%) trucks were carried to Nantucket Island. Table 5 indicates the approximate number of automobiles and trucks carried to Nantucket each month in 1963. Thirty percent of the trucks transported are trailer trucks occupying the space of three cars. Seventy percent of the trucks occupy the equivalent space of two cars each.

TABLE 5

Number of Automobiles & Trucks Carried to Nantucket From Woods Hole (1963)

Month	Cars	Trucks	Equiv. Cars & Trucks
January	395	210	878
February	395	150	740
March	482	180	896
April	876	242	1,432
May	1,095	330	1,854
June	2,540	390	3,437
July	3,984	390	4,881

TABLE 5 (Cont'd)

Number of Automobiles & Trucks Carried to Nantucket From Woods Hole (1963)

Month	Cars	Trucks	Equiv. Cars & Trucks
August	4,707	420	5,671
September	2,846	361	3,676
October	1,424	300	2,114
November	832	240	1,384
December	789	211	1,274
Total	20,365	3,424	28,237

b. The combined capacity of the two ferries presently using the harbor is 68 automobiles per trip each way. Each ferry makes two scheduled round trips per day to Nantucket during the months of July and August. On this basis, the ferries have a total one-way capacity of 4,216 equivalent autos per month on scheduled trips.

c. During July, 4,881 automobiles and equivalent trucks were actually delivered and 5,671 were transported in August 1963, for a total of 10,552 during the two month period. The theoretical number of unscheduled trips required to transport these additional vehicles was 32 trips per boat.

50. The computation of benefits to be derived from channel improvements are as follows:

a. A trip from Woods Hole to Nantucket requires 2-1/2 hours each way at an operating cost of $140 per hour.

b. A new ferry with a capacity of 25 automobiles, similar to the one placed in service in 1965, is contemplated by the Steamship Authority if no harbor improvement is made. This vessel would cut travel time to 2 hours.

c. It is estimated that a small ferry of 25 car capacity would have a net cost of approximately $750,000 and would have a life expectancy of 40 years. The estimated annual cost of capital recovery has been computed at an interest rate of 3-1/8 percent and would amount to: $750,000 x 0.0461 = $34,575.

d. A large ferry with a draft of 14 feet and a capacity of 60 cars could carry 3,720 cars per month, based on two trips per day. The total available capacity of the ferries serving Nantucket would be 7,750 automobiles per month, sufficient for immediate and near future use. Steamship authorities have stated that a large ferry with modern diesel motors and electronic navigation equipment would require a crew no larger than that needed for a small ferry. The savings in salary cost coupled with more than double the carrying capacity, would result in a net operating cost only slightly greater than that of the small existing craft. The estimated cost of a new 60-car ferry is $1,400,000 with a life expectancy of 40 years. The estimated annual cost of capital recovery has been computed at an interest rate of 3-1/8 percent and would amount to: $1,400,000 x 0.0461 = $64,540.

e. Annual capital recovery cost of large ferry over small ferry: $64,540 - $34,575 = $29,965.

f. During the 50-year project life, the shipment of vehicles to Nantucket is expected to increase approximately 3 percent a year, primarily due to summer population growth; 0.03 x 28,237 equivalent autos x 50 years / 28,237 - 70,587, equivalent automobiles per year at the end of 50 years. Two vessels making two trips per day would be 46,800 cars per year. An additional ferry of 25-car capacity would have to make 23,787/25 = 952 trips to carry the excess number of vehicles. With a large ferry of 60-car capacity, trips required would be 23,787/60 = 396. With a 4 hour running time per round trip from Woods Hole, the annual operating cost of the small ferry would be 952 trips x $140/hour x 4 hours/trip = $533,120 and with a 60-car ferry the cost would be 396 trips x $145/hour x 4 hours/trip = $229,680, resulting in an annual savings of $303,440 due to the channel improvement at the end of 50 years. The average annual equivalent to this benefit is 0.387 x $303,440 or $117,432. The net annual benefit resulting from increased demand for transportation over the 50-year life of the project would be $117,432 - 29,965 = $87,467.

51. The ferries currently operating to Nantucket are subjected to high winds and cross currents, on occasion within the harbor. This greatly affects their maneuverability, due in part to shallow draft design. In 1960 the "Nantucket" struck one of the breakwaters at the harbor entrance causing damage to the hull estimated at $8,400. The vessel was unable to run the following weekend and

could not carry a full load during the summer season. Twenty-two trips during the 1962-1963 season and 12 trips in 1963-1964 were cancelled due to adverse weather conditions. Operational delays range from 2 to 14 hours with an average standy time of 6 hours. A deeper draft vessel could make approximately 10 of these trips:

Cost of operating large ferry:	10 trips x $145/hr x 2.0 hrs/trip = $2,900
Cost of operating small ferry:	10 trips x $140/hr x 2.0 hrs/trip = $2,800
Standby cost of smaller vessel:	10 trips x $95/hr x 6.0 hrs/trip = $5,700
Annual Benefit:	$2,800 + $5,700 - $2,900 = $5,600

52. There has been a recent increase in the number of large fishing vessels with drafts of 12 to 14 feet operating out of New Bedford and other mainland ports. Most of these vessels pass close to Nantucket to reach the fishing grounds on Georges Bank. The existing 15-foot entrance channel to Nantucket is considered to be inadequate for these vessels when they are seeking a harbor of refuge. An increased depth in the channel to 18 feet would encourage use of the harbor as a harbor of refuge for an estimated annual benefit of $3,000.

53. The total estimated annual benefits probable of accrual to a deeper draft ferry service and to the deeper draft fishing vessels from improvement of the existing Federal project are estimated to be $96,067. These benefits are based on the operation of a larger deeper draft ferry than presently used by the Steamship Authority. Recent correspondence with the Authority indicates that there can be no assurance that a large ferry will be operated by the Authority.

54. Benefits to be derived from breakwater protection in Nantucket Harbor would be both general and local in nature. General benefits would accrue to the transient fishing fleet of about 150 trawlers which operate out of New Bedford and the 12 local trawlers that now fish in adjacent waters. Refuge from northeast storms is needed in the locality. The nearest harbor of refuge is at least 25 miles away. During northeast storms these boats do not seek shelter in Nantucket considering it unsafe. If they do not have time to reach the mainland, they proceed to the lee side of the island to ride out the storm. Either procedure constitutes a hazardous operation. Based on the limited available data, benefits for a harbor of refuge are not readily susceptible of firm monetary evaluation. It is considered that a conservative estimate would amount to $4,000 annually.

55. Storm damage in Nantucket Harbor is reported to have reached a high of $100,000 in one northeast storm. Because of the frequency of severe easterly storms which occur on the average of 4 times a year and the exposed location of the commercial waterfront the locally based fishing fleet of 12 trawlers and 50 scallopers have experienced considerable damage. It is estimated that this damage averages $100 per boat each year. Approximately $5,000 of this damage could be prevented annually by a reduction in waves in the area of the waterfront wharves where these vessels are berthed.

56. The locality is also a favorite cruising ground for recreational craft, including charter and sports fishing boats. The distance between Nantucket and the mainland coast of Cape Cod is about 25 miles. It is claimed that vessels using the harbor, generally leave when a storm is forecast. If unable to reach the mainland, they seek shelter with the fishing fleet in the lee of the island. Many of these boats would remain anchored in the shelter of a breakwater. While conditions in this case make impractical a firm monetary evaluation of benefits, in the best judgement of the reporting officer, they would approximate $4,000 annually, which is half local and half general benefits.

57. Benefits from reducing storm damage to the locally based recreational fleet and those transient boats which are unable to leave the harbor in time are based on a reduction of exposure to wave attack. During storms and hurricanes, boat anchors or moorings have not held and the boats have drifted into the docks or on shore. Extra care and expense are needed to insure safe moorings under present conditions. No information is available on the amount of damages suffered. Local interests claim that most of the damaged boats are taken elsewhere for repair due to the limited service facilities available at Nantucket. In order to determine benefits accruing from prevention of storm damage to these craft, an estimate has been made based on the annual net return to the owners if the boats were "for hire". This is equivalent to the amount of benefits the owners would receive due to increased use of their craft. In general, the net return varies with the type and size of boat, expressed in terms of its average depreciated value. The ideal net return is considered the maximum return that could be obtained with full unrestricted use of the harbor. For this harbor, the ideal net return varies from 15 percent for the charter boats

to 8 percent for large cruisers. Computation of the benefits depends upon the difference between the net return now received with the return that can be received upon improvement. The value of net return entails consideration of such factors as a shorter boating season than enjoyed by mainland based boats, rough harbor conditions which could exist even after the breakwater improvement because of a shift in wind direction to an unprotected quadrant and the length of stopover by visiting craft. Future value was based on increased use of the harbor made possible by the breakwater. The locally based recreational fleet that would benefit from the breakwater protection is comprised of 125 outboards, 75 inboards and 20 charter boats. It is estimated that an annual benefit of $4,200 would be realized from a reduction in storm damage (See table 6).

58. Over 2,000 transient craft visit the harbor each boating season for an average stopover of 4 days. With a boating season of 90 days, this amounts to 8,000 boat-days or an equivalent of 89 locally based boats. Local interests believe that with breakwater protection at least double the present number of transient craft would be attracted to the harbor. This would be equivalent to 95 locally based boats. Annual benefits for present and future transient craft are estimated at $7,900 and $8,500 respectively. (See tables 7 and 8).

59. It is not expected that there will be any substantial number of boats transferred to the harbor as a result of improvement because of its remote location in relation to other recreational boating harbors. However, during the 50-year life of the project, recreational boating by local interests is expected to increase at least 50 percent by the purchase of new boats independent of the harbor improvement. The annual benefits for these future boats is estimated to be $7,000 (See table 9).

60. A summary of annual benefits to be realized from the proposed breakwater on Hussey Shoal is tabulated below. General benefits would accrue to the transient and local fishing fleets. Benefits to recreational boating including sport fishing and reduction of storm damage to recreational craft are considered equally general and local. Federal participation would be limited to 50 percent of the construction costs of the breakwater where recreational benefits are concerned.

25% increase in local fleet since 1956

TABLE 6 BENEFITS TO RECREATIONAL BOATING
Locally Based Fleet

90 Day Boating Season

HARBOR: NANTUCKET, MASS.

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20	125	850	106,000	13	85	95	1.3	1,378			
Inboards	10-20	75	1,100	82,500	11	85	95	1.1	907			
Cruisers	15-30											
	31-50											
	51-60											
Aux. Sail	15-30											
	31-40											
	41-60											
Sailboats	10-20											
	21-30											
	31-40											
	41-60											
Charter Boats												
Cruisers	21-35	20	5,600	112,500	15	80	95	2.2	2,475	20	22	505
TOTALS		220		$301,000					$4,760			505

Annual Benefits = $4,760 - 505 = $4,255 Say $4,200

TABLE 7. BENEFITS TO RECREATIONAL BOATING

Existing Equivalent Transient Fleet

90 Day Boating Season

HARBOR: NANTUCKET, MASS.

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20											
Inboards	10-20											
Cruisers	15-30	3	4,500	13,500	9	80	95	1.3	175			
	31-50	52	10,000	520,000	8	85	95	0.8	4,160			
	51-60	3	12,000	36,000	8	85	95	0.8	290			
Aux. Sail	15-30											
	31-40	24	8,000	192,000	8	80	95	1.2	2,305			
	41-60	6	20,000	120,000	8	85	95	0.8	960			
Sailboats	10-20											
	21-30	1	3,000	3,000	11	80	95	1.6	50			
TOTALS		89		$884,500					$7,940			

Annual Benefits $7,900

TABLE 8. BENEFITS TO RECREATIONAL BOATING

Equivalent Attracted Transient Fleet

HARBOR: NANTUCKET, MASS.

90 Day Boating Season

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20											
Inboards	10-20											
Cruisers	15-30	4	4,500	18,000	9	80	95	1.3	235			
	31-50	53	10,000	530,000	8	85	95	0.8	1,240			
	51-60	3	12,000	36,000	8	85	95	0.8	288			
Aux. Sail	15-30											
	31-40	26	8,000	208,000	8	80	95	1.2	2,496			
	41-60	7	20,000	140,000	8	85	95	0.8	1,120			
Sailboats	10-20											
	21-30	2	3,000	6,000	11	80	95	1.6	96			
TOTALS		95							$8,475			

Annual Benefits $8,500

TABLE 9. BENEFITS TO RECREATIONAL BOATING

New Boats

90 Day Boating Season

HARBOR: NANTUCKET, MASS.

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20	60	700	42,000	13	0	95	12.3	5,166			
Inboards	10-20	35	1,400	49,000	11	0	95	10.4	5,096			
Cruisers	15-30 31-50 51-60	5	8,000	40,000	8	0	95	7.6	3,040	30	33	1,003
Charter Boats												
Crusiers	21-35	10	5,000	50,000	15	0	95	14.2	7,100	20	22	1,562
TOTALS		110		$181,000					$20,402			$2,565

Annual Benefit = $(20,402-2,565) x 0.39115 = $6,977 Say $7,000

SUMMARY OF HUSSEY SHOAL BREAKWATER BENEFITS

(1) Harbor of refuge	General	Local	Total
Fishing Fleets	4,000	-	4,000
Recreational Fleet	2,000	2,000	4,000
(2) Storm Damage Reduction			
Fishing Fleet	5,000	-	5,000
Recreational Fleet			
Existing Local	2,100	2,100	4,200
Existing Transient	3,950	3,950	7,900
Attracted Transient	4,250	4,250	8,500
Locally based new boats	3,500	3,500	7,000
TOTALS	$24,800	$15,800	$40,600
PERCENTAGE	61%	39%	100%

APPORTIONMENT OF COST AMONG INTERESTS

61. The computed benefits for channel improvement are general. Therefore, all first costs for this improvement are apportioned as Federal. Local interests would, however, be required to dredge and maintain a berth at the Steamship Authority dock commensurate to the proposed channel depth.

First Cost of Dredging Entrance Channel (from Paragraph 44)

Estimated Project Cost

Dredging of Channel (Corps of Engineers)	$300,000
Non-Federal Cost (Berth Improvement)	45,000
TOTAL PROJECT	$345,000

62. The apportionment of costs for the proposed breakwater on Hussey Shoal has been computed as 61 percent Federal and 39 percent local based on the percentage of the general and local benefits to be derived.

First Cost of Breakwater Protection (from Paragraph 45)

Estimated Project Cost

Construction of breakwater with Federal and Non-Federal funds	$410,000

First Cost of Breakwater Protection (Cont'd)

Aids to Navigation (U.S. Coast Guard)	30,000
TOTAL PROJECT COST	$440,000

Apportionment of First Costs

Federal

Corps of Engineers (0.61 x $410,000)	$250,000
U. S. Coast Guard	30,000
TOTAL FEDERAL COST	$280,000

Non-Federal

Cash contribution by local interests (0.39 x $410,000)	$160,000
TOTAL PROJECT COST	$440,000

ESTIMATES OF ANNUAL CHARGES

63. The annual charges for the improvement have been computed using a project life of 50 years and an interest rate of 3-1/8 percent for both Federal and Non-Federal charges. Maintenance costs for dredging the channel and turning basin are based on experience with the existing Federal project and similar conditions. An allowance of 4,000 cubic yards of dredging per year in the Federal project has been made. Maintenance costs of the breakwater are based on experience with similar structures under comparable conditions. The investment and annual charges for the improvements are shown below:

DREDGING

Federal Investment

Corps of Engineers, construction cost	$300,000

Federal Annual Charges:

Interest and Amortization (0.03979 x $300,000)	11,937
Maintenance: Channel dredging	6,000
TOTAL FEDERAL ANNUAL CHARGES	$ 17,937

Non-Federal Investment	
Berthing Facilities	$ 45,000
Non-Federal Annual Charges	
Interest and Amortization: berth improvement (0.03979 x $45,000)	1,790
Maintenance: berthing area	2,000
NON-FEDERAL ANNUAL CHARGES	$ 3,790
TOTAL FEDERAL & NON-FEDERAL ANNUAL CHARGES	$ 21,727

BREAKWATER

Federal Investment	
Corps of Engineers	$250,000
Coast Guard	30,000
	$280,000
Federal Annual Charges	
Interest and Amortization (0.03979 x $280,000)	$ 11,141
Maintenance, replacement of armor stone	1,200
Navigation Aids	600
TOTAL FEDERAL ANNUAL CHARGES	$ 12,941
Non-Federal Investment	$160,000
Non-Federal Annual Charges	
Interest and Amortization (0.03979 x $160,000)	6,366
TOTAL FEDERAL AND NON-FEDERAL ANNUAL CHARGES	$ 19,307

COMPARISON OF BENEFIT AND COST

64. Comparison of the estimated annual benefits totalling $96,067 resulting from channel improvement and annual charges of $21,727 indicates a benefit-cost ratio of 4.4 to 1. The evaluated annual benefits of

$40,600 and annual charges of $19,307 for the Hussey Shoal breakwater indicates a benefit-cost ratio of 2.1 to 1.

PROPOSED LOCAL COOPERATION

65. The benefits to be derived from the channel improvement are general in nature and therefore local interests should not be required to make a cash contribution towards the first cost of construction of the Federal project. Local interests should be required to provide, without cost to the United States, all lands, easements and rights-of-way necessary for construction and maintenance of the improvement. Because construction by hydraulic dredge with disposal on land would be less costly than by bucket dredge with disposal at sea, local interests should provide suitably diked spoil disposal areas on land. The U.S. Fish and Wildlife Service anticipates no adverse effects on fish and wildlife resources from hydraulic spoil disposal. Local authorities would be required to hold and save the United States free from property damages that may result from the construction and maintenance of this project.

66. In order to modify the existing Federal project through channel improvement, the Steamship Authority would have to show justification for use of deeper draft vessels than currently being used for ferry service to the island, agree to use such ships and assume the cost of improving berthing facilities at the Nantucket terminal, currently estimated at $45,000 with an annual cost of $3,800 including maintenance. The Authority has recently taken the position that it is more economical from their point of view to use smaller type vessels.

67. If the proposed breakwater were constructed on Hussey Shoal, certain items of local cooperation would be required. The benefits to be derived from the protection are 61 percent general and 39 percent local in nature. It is, therefore, considered that local interests should be required to make a cash contribution of 39 percent of the construction cost. This contribution is now estimated to be $160,000. Because of the recreational benefits involved, local interests should be required to provide and maintain, at local expense, an adequate public landing with provisions for the sale of motor fuel, lubricants and potable water, available to all on equal terms. Local interests should be required to provide, without cost to the United States, all lands, easements and rights-of-way required for construction and subsequent maintenance of the project; also hold and save the United States free from all damages due to the construction work and subsequent maintenance of the project.

COORDINATION WITH OTHER AGENCIES

68. All Federal, State and local agencies known to have an interest in the development and use of the waterway were notified of the public hearing held at Nantucket, Massachusetts on 16 April 1957. Subsequent to the hearing, meetings were held with officials of the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority and local interests to obtain additional information. The United States Coast Guard reviewed the plans of improvement and advised that additional aids to navigation would be required for the breakwater improvement. The Regional Director of the United States Fish and Wildlife Service and the Massachusetts Division of Marine Fisheries were consulted concerning the proposed improvements. These agencies were of the opinion that the proposed improvements would have no adverse effect on shellfish and wildlife habitat. (See Appendix C).

DISCUSSION

69. Nantucket Sound is a favorite area for offshore cruising of recreational boats. Nantucket Harbor, located on the south side of the Sound, is a favorite port of call for these craft, with the harbor crowded throughout the boating season. During the remainder of the year, it is used by fishing fleets. It is the nearest harbor to part of the offshore fishing grounds that is available to the deeper-draft fishing boats. Passengers, vehicles and freight are transported to the island year-round by ferries from the mainland and Martha's Vineyard. Additional cargo and passengers are carried by contractors and private carriers at irregular intervals.

70. The Woods Hole, Martha's Vineyard and Nantucket Steamship Authority officials and business interests in Nantucket requested a deeper navigation channel into the harbor to permit improved ferry service to the island. Deepening of the entrance channel to 18 feet and widening it in the vicinity of Coatue Point is considered to be economically justified if deeper draft ferry vessels are used. The draft of all ferries using Nantucket Harbor is limited to 10'-6" by Coast Guard regulations. Due to this requirement, imposed by channel restrictions, the superstructure of the existing ferries present a large sail area relative to their draft. Transverse winds and cross currents have combined to cause these vessels to veer dangerously off course while maneuvering within the harbor. In seeking a solution to this problem, the Steamship Authority has considered that a large deep-draft ferry could provide the needed service by being more seaworthy and carrying a greater number of vehicles.

71. The Steamship Authority has recently taken delivery on a new 25-vehicle capacity ferry of modern design which has caused them to reconsider their original request for a deeper channel. Many advanced engineering concepts have been built into this new vessel to enable it to effectively maneuver and hold a straight course under adverse conditions. Although this ferry is smaller than her sister-ships, these unique design features have given the vessel an exceptional speed, docking maneuverability and economy of operation. The Authority no longer desires channel improvement beyond that already authorized. They have stated that use of large vessels would require expensive improvements at all terminals used by the line.

72. Only minor benefits insufficient to justify improvement would accrue to the three companies that service the island with petroleum products. The petroleum is now supplied by motor barge or small tankers drawing 13-14 feet of water. Deeper draft vessels could be used after channel improvement but trips are too infrequent. Minor tidal delays experienced by the existing carriers are due chiefly to a lack of depth at terminal facilities.

73. Nantucket residents believe that the island's success as a popular summer resort depends to a great extent on its harbor facilities. They feel that the present harbor is adequate for normal activities, but that it is unsafe as an anchorage in easterly and northeasterly storms. These storms are reported to occur at least once every year during the boating season and considerable boat damage is incurred. For this reason, some form of breakwater protection is desired within the harbor. It is reported that when storm warnings are posted, a general exodus from the harbor is made by visiting craft. Invariably these boats do not return, resulting in a large decrease in business for the Town. In addition, it is claimed that many more boat owners avoid the harbor due to fear of being caught in an unexpected storm. It is reported that both fishing and recreational craft suffer considerable damage as a result of having to remain in the unprotected harbor during severe storms. A protected anchorage would eliminate this harbor deficiency and benefit the island.

74. To provide recreational craft and fishing vessels with a harbor of refuge and protection from storm damage, local interests proposed several plans of breakwater protection within the harbor. The most feasible plan would consist of a 1400-foot long breakwater located on Hussey Shoal. This breakwater would provide protection for about 50 acres of deep-water anchorage and reduce wave heights along the commercial waterfront. The evaluated benefits for this plan justify construction of this improvement. Some local interests are opposed to this breakwater claiming the location would interfere with sailing in the harbor and cause

congestion in the area of the commercial wharves. Local interests have reported that a private development corporation has recently acquired considerable property along the commercial waterfront for future development. At present, no plans have been made public as to the type or extent of improvement proposed by this organization. In view of this situation, it now appears that further consideration of harbor protection is dependent upon a review of local needs and desires following completion of waterfront improvement plans. Town officials have stated that the Town is not financially prepared to meet the required cost of local cooperation for any breakwater proposal of this magnitude. They have requested that further study of protection be held in abeyance.

CONCLUSIONS

75. The Division Engineer concludes that modification of the existing Federal navigation project in Nantucket Harbor is not warranted at this time. Although deepening and widening the entrance channel to enable the Steamship Authority to use deeper draft vessels could be accomplished, this work should be contingent upon berthing area improvements by the Steamship Authority commensurate with the channel improvement. It is the opinion of the Steamship Authority that the size and speed of the recently acquired 25-vehicle capacity ferry provides the ideal combination for faster, more frequent cargo and passenger service to the islands. It considers that vessels of this type offer the most economical sea transport and no longer desires channel improvement beyond that already authorized.

76. It is concluded that a breakwater would increase the usefulness of the harbor by providing a sheltered anchorage for the existing and anticipated fishing and recreational fleets. However, local interests are not in agreement as to the location and type of protection desired, and do not choose to meet the required share of the cost of the breakwater.

RECOMMENDATIONS

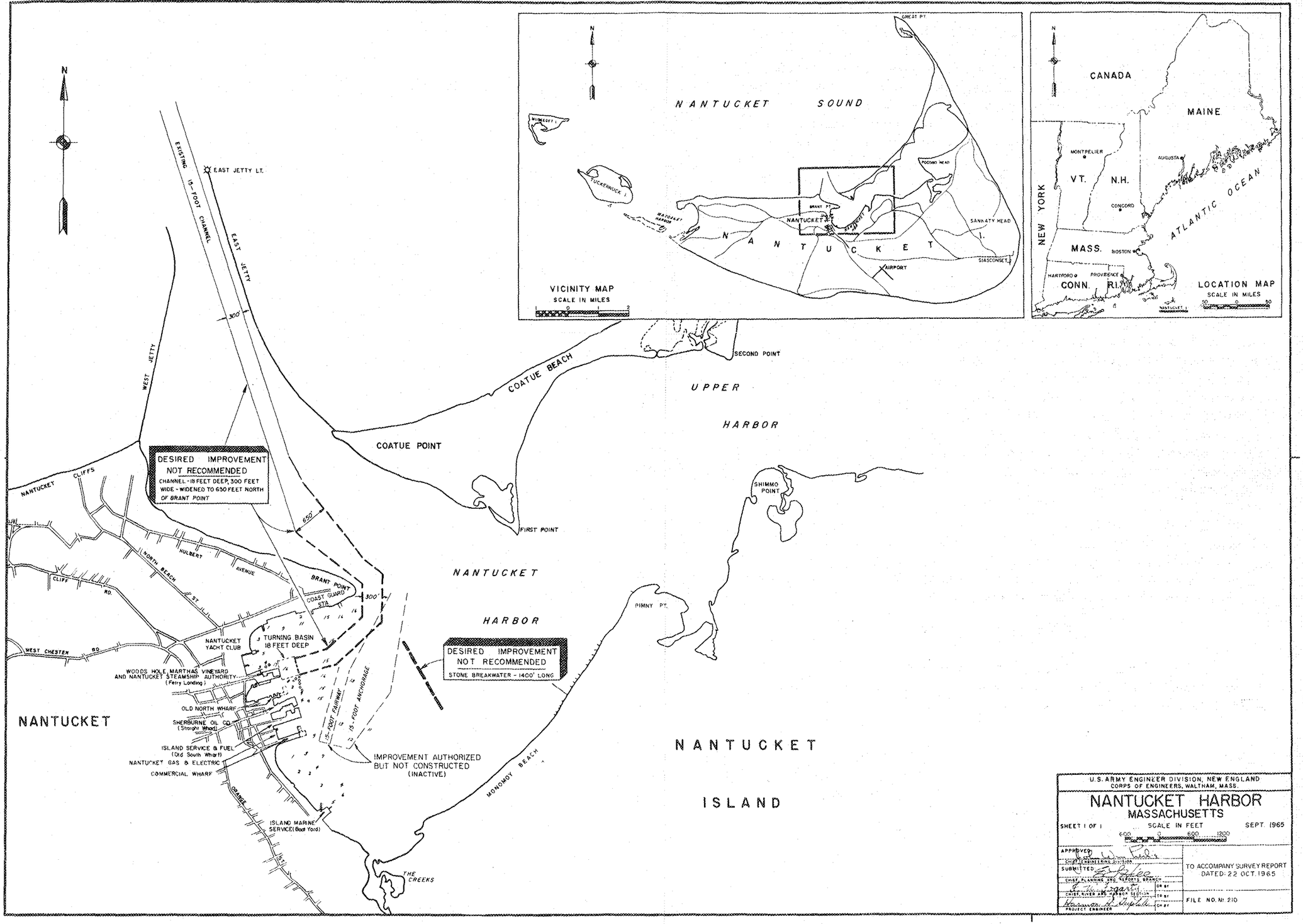
77. The Division Engineer recommends that no improvement to the existing Federal project at Nantucket Harbor, Massachusetts, be undertaken at this time.

6 Incls.
1. Maps-Plates 1, 2, 3
2. App. A-Est. of Cost
3. App. B-U.S. Coast Guard
4. App. C-U.S. Fish & Wildlife Service Report
5. App. D-Letters of Comment
6. Info-Senate Resolution 148

E. J. RIBBS
Colonel, Corps of Engineers
Acting Division Engineer

CORPS OF ENGINEERS

U. S. ARMY



U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

NANTUCKET HARBOR
MASSACHUSETTS

SHEET 1 OF 1 — SCALE IN FEET — SEPT. 1965

600 0 600 1200

APPROVED
CHIEF ENGINEERING DIVISION

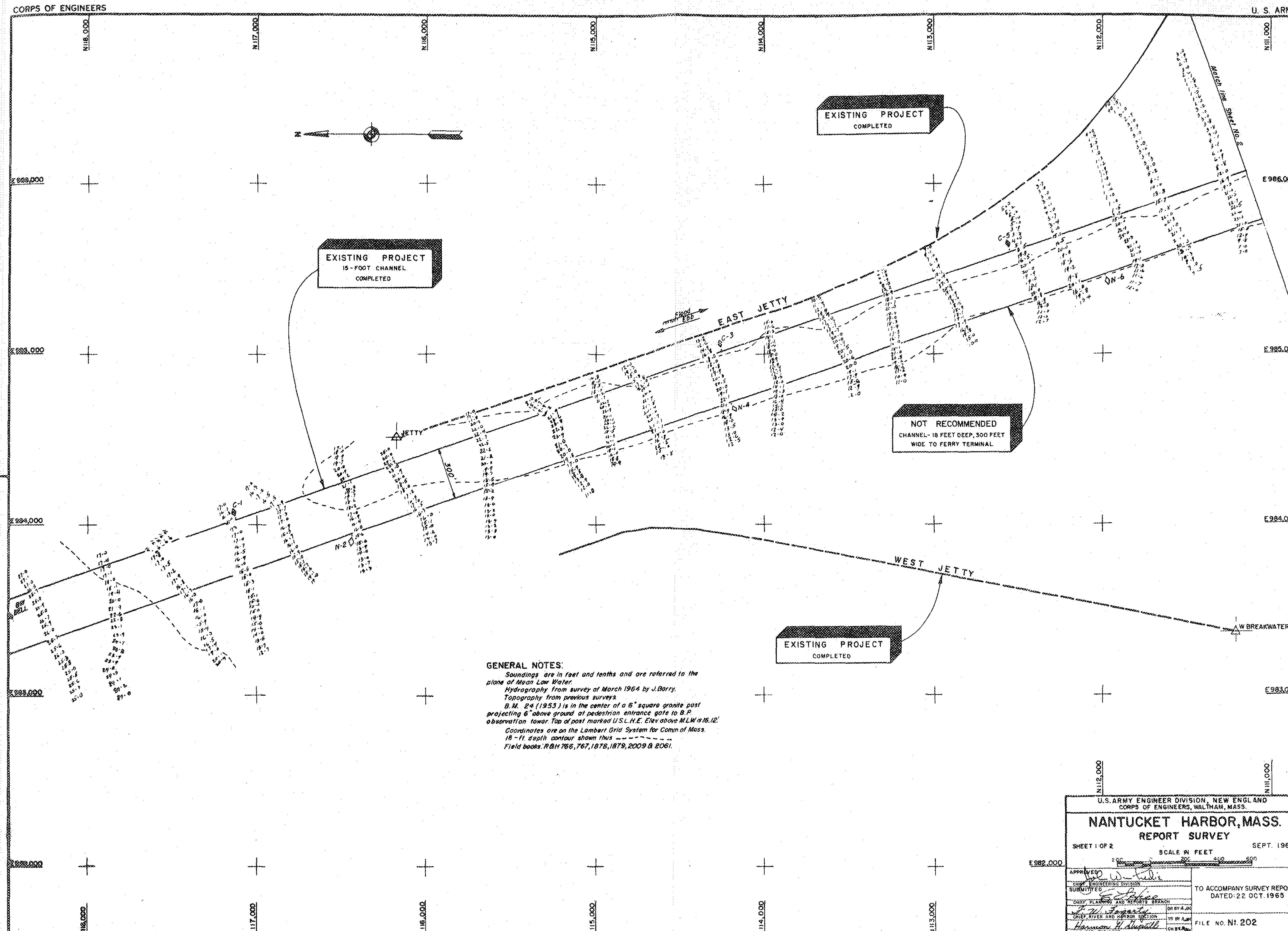
SUBMITTED
CHIEF, PLANNING AND REPORTS BRANCH

CHIEF, RIVER AND HARBOR SECTION — DR BY

PROJECT ENGINEER — TR BY — CH BY

TO ACCOMPANY SURVEY REPORT DATED: 22 OCT. 1965

FILE NO. NI 210



CORPS OF ENGINEERS
U. S. ARMY
EXISTING PROJECT
COMPLETED
EXISTING PROJECT
15-FOOT CHANNEL
COMPLETED
NOT RECOMMENDED
CHANNEL- 18 FEET DEEP, 300 FEET
WIDE TO FERRY TERMINAL
EXISTING PROJECT
COMPLETED
EAST JETTY
WEST JETTY
Flood
Ebb
JETTY
W BREAKWATER
Match line Sheet No. 2
300
C-1
C-3
C-5
N-2
N-4
N-6
N118,000
N117,000
N116,000
N115,000
N114,000
N113,000
N112,000
N111,000
E986,000
E985,000
E984,000
E983,000
E982,000
GENERAL NOTES:
Soundings are in feet and tenths and are referred to the plane of Mean Low Water.
Hydrography from survey of March 1964 by J. Barry.
Topography from previous surveys.
B.M. 24 (1953) is in the center of a 6" square granite post projecting 6" above ground at pedestrian entrance gate to B.P. observation tower. Top of post marked U.S.L.H.E. Elev. above M.L.W. is 16.12'.
Coordinates are on the Lambert Grid System for Comm. of Mass.
18-ft. depth contour shown thus - - - - - - - -
Field books: R&H 766, 767, 1876, 1879, 2009 & 2061.
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.
NANTUCKET HARBOR, MASS.
REPORT SURVEY
SHEET 1 OF 2
SEPT. 1965
SCALE IN FEET
200 0 200 400 600
APPROVED
CHIEF, ENGINEERING DIVISION
SUBMITTED
CHIEF, PLANNING AND REPORTS BRANCH
F. W. Fogarty
CHIEF, RIVER AND HARBOR SECTION
Harmon H. Dugstill
PROJECT ENGINEER
DR BY A.J.N.
TR BY A.J.N.
CH BY
TO ACCOMPANY SURVEY REPORT
DATED: 22 OCT. 1965
FILE NO. Nt. 202

PLATE-2

CORPS OF ENGINEERS

U. S. ARMY

E 991,000

E 990,000

E 989,000

E 988,000

E 987,000

E 986,000

N 111,000

N 110,000

N 109,000

N 108,000

N 107,000

N 106,000

N 105,000

N 104,000

NOT RECOMMENDED

STONE BREAKWATER - 1400 FEET LONG

NOT RECOMMENDED

CHANNEL: 18 FEET DEEP - 300 FEET WIDE

TURNING BASIN & BERTH

TO BE IMPROVED BY OTHERS

COATUE POINT

EAST JETTY

Flood Tide Flow

Ebb

Brant Point L.H.

Stone Sound No. 42

Rear Range Beacon

Front Range Beacon

Driftwood

BRANT POINT

Lodgmoore

Beach Haven

The Breakers

N.E. Steamship Co

L.L. Carlisle

John Feiler Inc.

Island Service Company

Commercial Dock

Nantucket Gas & Elect Co

350

GENERAL NOTES:

Soundings are in feet and tenths and are referred to the plane of Mean Low Water.

Hydrography from survey of March 1964 by J. Barry.

Topography from previous surveys.

B.M. 24 (1953) is in the center of a 6" square granite post projecting 6" above ground at pedestrian entrance gate to B.P. observation tower. Top of post marked U.S.L.H.E. Elev. above M.L.W. is 16.12'.

Coordinates are on the Lambert Grid System for Comm. of Mass.

Field books: R B H 766, 767, 1878, 1879, 2009 & 2061

Soundings in the approach to the Steamship Terminal are from survey made in 1941.

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

NANTUCKET HARBOR, MASS.
REPORT SURVEY

SHEET 2 OF 2

SCALE IN FEET 100 0 200 400 600

SEPT. 1965

APPROVED:
CHIEF, ENGINEERING DIVISION

SUBMITTED:
CHIEF, PLANNING AND REPORTS BRANCH

CHIEF, RIVER AND HARBOR SECTION

PROJECT ENGINEER

DR BY A.J.H.

TR BY A.J.H.

CH BY

TO ACCOMPANY SURVEY REPORT
DATED: 22 OCT. 1965

FILE NO Nt. 202

PLATE-3

SURVEY OF NANTUCKET HARBOR, MASSACHUSETTS

APPENDIX A

ESTIMATES OF FIRST COST

1. Estimates of first cost have been prepared for two plans of improvement. The first plan consists of deepening the existing 15-foot entrance channel to a depth of 18 feet, 300 feet wide from the entrance bar into the harbor to a point 300 feet from the Steamship Authority terminal.

2. All dredging would be ordinary material, consisting of clay, sand and gravel. Dredging quantities have been estimated in terms of in-place measurement and include an allowance of one foot for over-depth dredging. Allowable side slopes are one vertical to 3 horizontal. The estimate of costs for the plan selected as the most feasible is detailed as follows:

COST ESTIMATE FOR DREDGING

Cost Account Number		Cost Estimate
09	Entrance Channel	
	Dredging 171,000 c.y. of clay, sand and gravel @$1.35	$ 230,000
	Contingencies @ 15%	35,000
		$ 265,000
	Engineering & Design	15,000
	Supervision & Administration	20,000
	Total Federal Project Cost:	$ 300,000

COST ESTIMATE - HUSSEY SHOAL BREAKWATER

10	Stone Breakwater - 1,400 feet long	
	Stone: Armor 13,500 tons @ $11	$ 149,000
	Core 18,700 tons @$9	168,000
		$ 317,000
	Contingencies @ 15%	48,000
		$ 365,000

COST ESTIMATE - HUSSEY SHOAL BREAKWATER (cont'd)

Total Brought Forward	$	365,000
Engineering & Design	$	20,000
Supervision & Administration		25,000
	$	410,000
Aids to Navigation (Coast Guard)		30,000
TOTAL PROJECT COSTS	$	440,000 *

* Excluding Pre-Authorization Costs of $10,000

Summary of Costs

Federal: ($410,000 x .61)	$	250,000
Non-Federal: ($410,000 x .39)		160,000
	$	410,000

TREASURY DEPARTMENT
UNITED STATES COAST GUARD

Address reply to:
COMMANDER (o)
1ST COAST GUARD DISTRICT
1400 CUSTOMHOUSE
BOSTON, MASS. 02109

. 11400
5 FEB 1963

From: Commander, First Coast Guard District
To: Division Engineer, U. S. Army Engineer Division, New England Corps of Engineers, 424 Trapelo Road, Waltham, Massachusetts

Subj: Proposed plan of improvement Nantucket Harbor, Nantucket, Massachusetts

1. The breakwater will not directly affect Coast Guard operations in the area. The proposed location appears satisfactory.

2. It has been determined that if the breakwater is constructed, two single pole lights will be required; one at each end of the breakwater. First cost is estimated at $30,000 and annual maintenance cost at $600.

C. B. LAMBERT
By direction

Copy to:
COMDT (OAN)
(w/encl)

APPENDIX C

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
59 Temple Place
Boston, Massachusetts 02111

September 15, 1964

Division Engineer
New England Division
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

This is our conservation and development report on the fish and wildlife resources related to navigation improvements being considered for Nantucket Harbor, Nantucket County, Massachusetts. Your study was conducted under the authority of the Resolution of the House Committee on Public Works, June 2, 1949. This report was prepared under authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inc.), in cooperation with the Massachusetts Division of Fisheries and Game and Division of Marine Fisheries. Those agencies concur in the report as indicated in their letters of September 11 and August 24, 1964, respectively.

Navigation improvements being considered are: (1) deepen sections of the main channel to 18 feet MLW; (2) extend the channel around Brant Point to the vicinity of the ferry dock; and (3) construct a rock breakwater in Nantucket Harbor south of a line between Brant and Coatue Points and about 3,000 feet east of the ferry dock in Nantucket Harbor.

Much of Nantucket Harbor, including the six-mile reach behind Coatue Beach, is an important bay scallop and quahog area. Quahogs are not harvested within the harbor in the vicinity of the docks because of pollution. However, pollution does not preclude the harvest of bay scallops west and south of the piers.

Important sportfish such as striped bass, bluefish, scup, and tautog are present in the Nantucket area. These and other species are taken by sport fishermen from the existing west jetty and in the Harbor area.

"The Creeks" and other wetland areas in the Harbor are important to waterfowl. In addition, they support fish and shellfish resources in the harbor by providing a steady supply of nutrients to adjoining open waters. These wetlands areas also provide shelter and nursery environment for several fish and shellfish species.

Dredging the main channel would cause only minor damage to the bay scallop resources.

Construction of the breakwater south of Brant and Coatue Points would cause no significant fish and wildlife losses. The breakwater would create minor incidental benefits to the sport-fishery since many fish species tend to congregate at such structures. These fish would be utilized by boat fishermen. No sport fisheries benefits could be attributed to fisherman use of the breakwater since it is not to be land-tied. If the breakwater were land-tied, it would impede circulation in the harbor to the extent that bay scallop production would be reduced.

Deposition of spoil in "The Creeks" area or upon marshlands in the Harbor would damage fish and wildlife resources and should be avoided. The spoil should be disposed of at sea on an approved dumping ground. If alternate spoil areas are necessary then spoil should be placed on the existing beaches, east and west of the channel entrance provided fill is suitable.

We recommend--

1. That all spoil resulting from the project be disposed of at sea on an approved dumping ground.

2. That if selection of alternate spoil areas are necessary, spoil be disposed on adjacent existing beaches east and west of the channel entrance (between Brant Point and Coatue Point).

We plan no further studies of this project unless your plans change or if spoil sites, other than those we recommend, are selected. Please advise us if your plans change or other spoil sites are considered so that we may advise you of possible effects upon fish and wildlife resources.

Sincerely yours,

Edward A. Sherman

Edward A. Sherman
Acting Regional Director
Bureau of Sport Fisheries and
Wildlife

John T. Gharrett

John T. Gharrett
Regional Director
Bureau of Commercial Fisheries

The Commonwealth of Massachusetts
Department of Public Works
Division of Waterways
100 Nashua Street, Boston 02114

August 3, 1965

E. J. Ribbs, Colonel
Deputy Division Engineer
Corps of Engineers, New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Reference: NEDED-R

Dear Colonel Ribbs:

This is a reply to your letter, dated July 28, 1965, concerning proposed modification of the Federal Navigation project at Nantucket.

The Division of Waterways is interested in this project only to the extent that the Town of Nantucket deems the work to be essential to the economy of the Island.

If town authorities agree that the proposed improvement is now desired and agree with local interests to contribute 50% of the local cost, as required by Chapter 29 of the Resolves of 1946, I feel certain that the General Court will provide State funds for participation in this project.

Very truly yours,

JOHN T. HANNON
Deputy Chief Engineer

WOODS HOLE, MARTHA'S VINEYARD AND NANTUCKET
STEAMSHIP AUTHORITY

P. O. Box 284, WOODS HOLE, MASSACHUSETTS 02543
Phone Falmouth Kimball 8-5011

ISAAC C. NORTON, CHAIRMAN
JAMES H. SMITH, VICE CHAIRMAN
ALEXANDER M. CRAIG, JR., SECRETARY

FRANK B. LOOK
GENERAL MANAGER AND TREASURER

September 3, 1965

Colonel E. J. Ribbs
Deputy Division Engineer
U. S. Army Engineers Division
Corps of Engineers
424 Trapelo Road
Waltham, Mass. 02154

Reference: File No. NEDED-R

Dear Sir:

An answer to your letter of July 28 has been delayed in the hope that the result of placing a smaller type ferry in service on this line would reveal the advisability of setting up a long term program with a change to more of the smaller type vessels instead of large vessels of deeper draft. Unfortunately, the experience to date has not been conclusive.

In view of the physical set-up of our other terminals, I do not feel that the Authority will be building vessels of a deeper draft than we currently operate and I believe the tendency will be towards smaller vessels of a lighter draft. Therefore, I hesitate to state that deepening the channel into Nantucket to 18' at mean low water is of vital interest to our operation, or that the Authority would carry out the provisions of the item a.

In the event that the channel were deepened to 18' the Authority would be in a position to carry out the provisions of item b if a deep draft vessel were placed in operation.

It is my understanding that other local interests in Nantucket feel that the deepening of the channel is of great importance to them, and possibly their requirements would be sufficient for you to carry out the work as outlined.

Very truly yours,

Frank B. Look

FRANK B. LOOK

FBL:ej

WOODS HOLE, MARTHA'S VINEYARD AND NANTUCKET
STEAMSHIP AUTHORITY

P. O. Box 284, WOODS HOLE, MASSACHUSETTS 02543

Phone Falmouth Kimball 8-5011

November 2, 1964

Mr. Angelo Mauriello
Assistant Chief
Rivers and Harbor Division
U. S. Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Mauriello:

This Authority is currently operating two steamers between Nantucket and the mainland port of Woods Hole for the transportation of passengers, automobiles and freight: (1) the S/S Nantucket, built in 1956, is a vessel of 2,600 gross tons with a capacity of 50 cars and 1,200 passengers; and (2) the S/S Nobska, a vessel of 1,082 gross tons constructed in 1925, with a capacity of 28 automobiles and 1,021 passengers.

The traffic as moved over our line between Woods Hole and Nantucket for the past four years is as follows:

	Number of Trucks	Freight in Tons	Number of Passengers	Number of Automobiles
Totals - 1960*	1,772	12,412	81,031	10,791
Totals - 1961	3,350	20,400	126,611	16,433
Totals - 1962	3,188	19,506	125,944	17,403
Totals - 1963	3,424	23,328	137,647	20,365

* An extended strike ended July 1, 1960

Automobiles and passengers do not follow a steady flow but tend to peak over holidays and normal dates for change of vacation periods. Concentration of traffic at such periods has taxed the capacity of our vessels, and that, coupled with a substantial growth in volume over the period, presents the Authority with the necessity of providing additional equipment in the near future. In addition to the small deck space, the age and design of the S/S Nobska are other factors that add to the need for new equipment.

The Authority has been limited in design of vessels to a 10' 6" draft in order to pass safely in and out of Nantucket Harbor. This handicap is very noticable in the case of the S/S Nantucket which should have a draft of at least 14' in order to give her the sea-keeping qualities and capacity in cargo tons that would normally be expected of a 230' vessel.

The Authority will have to replace the S/S Nobska with a vessel having at least the capacity of the S/S Nantucket in order to handle the traffic presently presented and allow an extra margin for growth. The Authority would like to be able to build a vessel with characteristics that would provide good handling qualities and permit built in economies that would increase the speed and reduce the operating costs. Such economies could not be accomplished in a boat of the Nantucket's size if restricted to the 10' 6" draft by water limit and 10' 3" mean draft as placed on that vessel by the Coast Guard because of the characteristics of her underbody.

An 18' channel into Nantucket is essential to permit us to build an economic and suitable piece of equipment for this service.

If any additional information would be of assistance to your Department, kindly advise us.

Very truly yours,

FBL:ej

Frank B. Look
General Manager

BOARD OF SELECTMEN

BOARD OF COUNTY COMMISSIONERS
BOARD OF HEALTH BOARD OF PUBLIC WELFARE

NANTUCKET, MASSACHUSETTS

Dial 228-0790

10 March 1965

E. J. Ribbs
Col. Corps of Engineers
U.S.Army Engineer Division, N.E.
424 Trapelo Road
Waltham, Massachusetts

Dear Col. Ribbs:

In clarification of our letter of 4 March relative to improvements in Nantucket Harbor we are in present accord with the matter of deepening the design depth of the entrance channel as stated.

On the matter of the rip rap jetty at Hussey Shoal it would appear that in view of the present loan committments of the town that we would not be in a position to undertake our share of this project should it come up in the near future and would request that this matter be held in abeyance at the present time.

Very truly yours

James K. Glidden, Secy.

BOARD OF SELECTMEN

BOARD OF COUNTY COMMISSIONERS
BOARD OF HEALTH BOARD OF PUBLIC WELFARE

NANTUCKET, MASSACHUSETTS

Dial 228-0790

4 March 1965

E. J. Ribbs
Col. Corps of Engineers
U.S. Army Engineer Division, New England
424 Trapelo Road
Waltham, Massachusetts

Dear Col. Ribbs:

In reply to your letter of the 25th of Feb. relative to the Nantucket Harbor projects, please be advised that we are vitally interested in the matter of having the design depth of the entrance channel increased as requested by the Steamship Authority, this is of vital importance to the economy of the Island. It is our understanding that this project if approved would entail no cost to the town so no local commitment is necessary.

On the matter of the proposed rip-rap jetty at Hussey Shoal area in Nantucket Harbor we are also in accord with this and feel it would provide the necessary protected anchorage. As to a commitment, I should point out that the Town operates through an annual Town Meeting and final approval of the Towns share of funds could only be approved at such a meeting. When the proper time arrives we will be glad to insert the necessary article in a Town meeting warrant and take up with the state D.P.W. the matter of their share of the project.

Very truly yours
Board of Selectmen

James K. Gruden, Secy.

JKG/rt
file
A.Craig,S.Auth.
J.Hannon DPW

NANTUCKET HARBOR, MASSACHUSETTS

Information Called for By Senate Resolution 148
85th Congress Adopted 28 January 1958

1. Navigation Problems. Nantucket Harbor is located on the north side of Nantucket Island in the Atlantic Ocean, 25 miles south of Cape Cod. The entrance to the harbor from Nantucket Sound lies between converging stone jetties. The main harbor south of Brant Point is about one mile square. A Federal channel 300 feet wide extends from the Sound into the harbor for a distance of 1.6 miles. The design depth of the channel is 15 feet mean low water.

2. The principal navigation problems in Nantucket Harbor involve a lack of sufficient depth in the entrance channel to operate a deep-draft vessel in order to improve ferry service to the island. The harbor is adequate for fishing and recreational craft under normal conditions, but it is considered unsafe as an anchorage in easterly and northeasterly storms. For this reason, some form of breakwater protection is desired within the harbor.

3. Improvements Considered, Costs and Local Cooperation. The selected plans of improvement would provide for dredging of the entrance channel to 18 feet mean low water, widening to 650 feet in the bend north of Brant Point and construction of a 1400-foot long stone breakwater on Hussey Shoal, roughly parallel to and about 2,400 feet east of the commercial wharves located on the west shore of the lower harbor. The estimated Federal cost of dredging the channel is $300,000. The Woods Hole, Martha's Vineyard and Nantucket Steamship Authority would be required to improve their terminal berthing facilities by dredging at an estimated cost of $45,000 and to provide a deep-draft ferry requiring increased channel depth. Total annual benefits for the improvement would amount to $96,067. The estimated cost of breakwater construction totals $410,000. Benefits accruing from breakwater construction to commercial fishing fleets and to recreational boats would result in apportionment of cost as 61 percent general and 39 percent local. Computed average annual benefits total $40,600. On this basis, local interests would be required to:

a. Make a cash contribution of 39 percent of the cost of construction, presently estimated at $160,000.

b. Because of recreational benefits involved, local interests would be required to provide and maintain, at local expense, an adequate public landing with provisions for the sale of motor fuel, lubricants and potable water, available to all on equal terms.

c. Provide, without cost to the United States, all lands, easements and rights-of-way required for construction and subsequent maintenance of the project.

d. Hold and save the United States free from all damages due to the construction work and subsequent maintenance of the project. By letter dated 25 February 1965, the Town Selectmen in Nantucket were advised of the above requirements of local cooperation. The Board of Selectmen in a letter dated 10 March 1965, advised the Division Engineer that the Town of Nantucket would be unable to meet the requirements of local cooperation. The Steamship Authority was advised that deepening the existing channel is economically justified based on the condition that the Authority would use a deep-draft vessel. In a letter dated 3 September 1965, the General Manager of the Steamship Authority stated that the Authority does not anticipate operating vessels of a deeper draft than those currently in use.

4. Discussion. The navigation study has revealed that adequate shelter against severe storm conditions is not available within Nantucket Harbor for small craft and that the existing navigation channel is inadequate for operation of a deep-draft ferry to improve service to the island. Improvement of the harbor by construction of a stone breakwater and deepening the navigation channel are economically justified. Local interests have stated that requirements of local cooperation on breakwater construction could not be met. The Steamship Authority has stated that they no longer desire a deeper entrance channel than presently authorized. Therefore, the Division Engineer recommends no modification of the existing navigation project in Nantucket Harbor at this time.